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***Treaty Weakens America's Security***

# Comprehensive Test Ban Treaty Cannot Be Verified

The U.S. Senate should not give its advice and consent to the Comprehensive Test Ban Treaty (CTBT) for a number of reasons. A permanent ban of all underground nuclear tests will jeopardize U.S. national security by undermining confidence in the reliability and safety of the U.S. nuclear arsenal. The CTBT will replace 50 years of real-world testing (for which there is no substitute) with a scientific research program whose simulation and laboratory techniques are uncertain and will not mature for a decade. Indeed, some critical components of the Stockpile Stewardship Program (SSP) are already behind schedule and over-budget. Finally, the CTBT will do nothing to prevent proliferation, as countries who want to build nuclear weapons can continue to do so. [For an analysis of these issues, see RPC paper, "Comprehensive Test Ban Treaty Jeopardizes U.S. Nuclear Deterrent," 10/5/99.]

These are not the only problems with this treaty. Most glaring is the fact that the CTBT is not effectively verifiable, despite the vast array of expensive sensors and detection technology proposed for verifying compliance with the Treaty. Indeed, a front page story in Sunday's *Washington Post* cited a recent reassessment by the Central Intelligence Agency, which concluded that it cannot monitor low-level nuclear tests by Russia.

## Problems In The CTBT's Verification Regime

The verification regime rests on:

- The International Monitoring System (IMS), comprising facilities for seismological, radionuclide, hydroacoustic, and infrasound monitoring;
- U.S. National Technical Means (NTM);
- On-site inspections; and,
- Voluntary confidence-building measures.

The concept with this regime is flawed. The idea that even a technologically sophisticated system of sensors located at various geographical sites can provide effective

verification for a comprehensive test ban (which the Clinton Administration is interpreting to mean a zero-yield ban) has been discounted by one of President Clinton's former senior advisors. Jim Woolsey, Director of Central Intelligence, during this Administration's first term, stated: **"I believe that a zero-yield Comprehensive Test Ban Treaty is extraordinarily difficult, to the point of near impossibility — and possibly to the point of impossibility — to verify from afar"** [Senate Foreign Relations Committee Hearing, 5/13/98].

## Treaty Cannot Assure Detection of Militarily Significant Cheating

Effective verification requires high confidence that militarily significant cheating will be detected in a timely manner. And while the definition of the term "militarily significant" might vary, most observers would agree that any nuclear test that gives a nation information to develop newer, more effective weaponry is militarily significant.

Most new weapons designs can be adequately tested at yields of between one and 10 kilotons (kt), one kiloton being equivalent to 1,000 tons of TNT. Indeed, a yield of only 500 tons (an amount which is below the level that can be verified by the CTBT) would be sufficient for testing the reliability of existing nuclear weapons in the U.S. arsenal. [Bruce Tarter, Director of Lawrence Livermore National Laboratory, in answer to a question submitted for the record by Senator Jon Kyl, International Security Subcommittee of the Governmental Affairs Committee, 10/27/99, p. 77] It is also possible for other countries to test new weapons by using unusually small detonations. The Director of Los Alamos National Laboratory stated that a new class of U.S. weapons (if we were to produce new ones) could be tested by detonations as small as 1-10kt [Sig Hecker, in answer to a question submitted for the record by Senator Jon Kyl, International Security Subcommittee, 10/27/97, p. 84].

The CTBT's IMS system is to be built to detect blasts of 1 kt providing they are "fully coupled" (i.e., where no effort is taken to decouple by muffling the explosion or seismic signature by emplacing the weapon in a cavity). Nuclear tests with yields from 10 kt (a Hiroshima size blast) up to 70 kt would be difficult to confidently detect and identify if evasion (decoupling) techniques were used. The U.S. Intelligence Community has stated that the U.S. monitoring goal is to be able to detect a "few kilotons evasively tested." The United States cannot now, and will not in the foreseeable future be able to, confidently detect and identify militarily significant nuclear tests of one kiloton or less (a blast roughly 500 times larger than that which destroyed the Murrah Building in Oklahoma City). Concerns that Russia and China are exploiting the inability of U.S. NTM and the CTBT's IMS system to detect and identify low-yield tests recently led the Intelligence Community to reevaluate our detection capabilities.

## Methodologies for Cheating

A country wishing to violate the CTBT could do so through a number of means. Some of these methods are more sophisticated than others; however, each option highlights the fact that this treaty cannot be effectively verified.

***Very low-yield tests***

Tests below around one kiloton may not be detectable in various testing environments with current U.S. national detection means or the International Monitoring System (IMS) established by the treaty. And in this case, the violator doesn't even need to use specific concealment techniques.

Low-yield tests are still militarily significant. For instance, tests above 500 tons (but still below reliably detectable levels) would be of value for evaluating experimental and computational tools used to assess weapons performance. This is a potential purpose of the two low-yield tests India says it conducted last year — tests that were not detected by the IMS. For purposes of helping to validate models for assessing weapons safety, nuclear test yields of even a few pounds would be of value.

***Decoupling***

Decoupling can reduce detection of low-frequency seismic signals by up to a factor of 70, (one-seventieth of the strength) making it nearly impossible to be detected by any verification measures proposed under the CTBT. In a normal test, the device is placed in a small hole and the explosion transfers a great deal of energy to the surrounding rock, in turn creating strong seismic waves. But if the device were placed in a large cavity, the explosion would transfer less force to the surrounding walls resulting in a reduced seismic signal. Cavity construction can be completed using common mining equipment — it can be undertaken in either hard rock or in salt domes.

A five kt explosion would require a cavity of only 43 meters in radius in salt and 34 meters in hard rock to fully decouple the blast. Information on decoupling techniques is widely available in the public domain. The former Soviet Union has conducted extensive tests of decoupling and masking [Don A. Linger, et. al., "The Feasibility of Evasive Underground Nuclear Testing Through Decoupling," Defense Nuclear Agency, DNA-IR-94-88, 11/94]. And in 1966, the United States conducted salt dome tests in Chilton, Mississippi, during which a 380-ton nuclear test gave a seismic yield of only 5.3 tons.

***Anonymous tests***

Tests in international territory such as remote ocean areas, the upper atmosphere, or outer space would probably not be attributable to its source by the Treaty's International Monitoring System and might not be attributable by U.S. national intelligence means unless we observed the transport or launch of the nuclear device to the site of the explosion. The testing state could gain knowledge of its weapons' performance from the international media even if it were unable to instrument the test itself. There remains uncertainty about whether the South Atlantic flash in September 1979 recorded by optical sensors on the U.S. Vela satellite was a nuclear detonation and, if so, to whom it belonged.

### *Masking*

Masking uses other explosive activities to camouflage a test. For instance, a large conventional chemical explosion could be detonated to conceal the seismic signature of a nuclear test. The mining industry regularly conducts explosions in the range of hundreds of tons. There are about 20 mines in the United States that use chemical explosions of around 200 tons. Globally, the number is vast. Masking may be used together with decoupling techniques to further escape detection.

### *Methods to Avoid "Venting"*

The IMS system will also include radionuclide sensors to help detect radioactive debris "vented" through fissures (when it escapes the underground explosion via a vent or crack in the ground) when a test is conducted. This radioactive dust and debris would include materials from the tested nuclear weapon. A determined violator would have two avenues to defeat detection: to emplace the weapon in a deeper cavity, or to employ other containment means. Alternatively, they could "spoof" the known IMS sites by covering up or putting filters in front of the detectors.

## Other Problems: No Definition of Explosion

The CTBT fails to define the nuclear explosions to be banned. While the Clinton Administration interprets the ban as zero-yield, Russia never formally has agreed to adopt this interpretation. Thus, should tests by Russia be detected, which will be difficult, it will be able to assert that the CTBT does not, under Russia's interpretation, prohibit so-called hydronuclear tests (which release very small amounts of nuclear energy). In fact, Russian spokesmen have stated that hydronuclear tests should be a priority for Russia's nuclear program [Mikhailov, "Principles Essential for Designing Nuclear Weapons," Nezavisimovy Voyennoye Obozreniye, 3/99, reported by Foreign Broadcast Information Service]. Hydronuclear tests are not detectable by any of the methodologies under the CTBT's verification regime.

## Implications of Evasive and Clandestine Testing

Thus, a determined violator can test at fairly high yields — at least in the 10-kt range and perhaps much higher. Existing salt cavities can be used to decouple tests in excess of 10 kt and new cavities, if required, can be made inexpensively by solution mining. A combination of partial decoupling and simultaneous chemical explosions may be able to mask explosions in hard rock of about 10 kt. While evasive techniques are expensive and complex, the costs are relatively low compared to the expense of a nuclear weapons program, and no more complicated than weapons design.

Further, established nuclear powers are well positioned to conduct clandestine testing to assure the reliability and undertake at least modest upgrades of their arsenals. Russia and China have less than stellar compliance records regarding arms control and non-proliferation commitments. According to press reports, U.S. intelligence agencies believe China conducted a small underground nuclear test in June and Russia is believed to have conducted a nuclear test at its Novaya Zemlya test site in early September of this year. An interagency intelligence

committee concluded that Russia conducted as many as five tests over the past 18 months (i.e., from December 1998 to June 1999) [*Washington Times*, 6/25/99; 9/15/99].

In fact, the Intelligence Community recently reevaluated its verification capabilities regarding such tests, specifically those conducted by Russia. The conclusion: these events fall into a gray area in which the CIA cannot reliably distinguish between a conventional explosion and a low-level nuclear test, or even natural seismic activities. In other words, the CIA does not claim to have conclusive data one way or the other. As a senior United States official commented, "Tests at these kinds of levels are difficult to characterize in an exacting manner, and that is a major challenge to the intelligence community" [*Washington Post*, 10/3/99]. While neither Russia nor China has ratified the CTBT, both have signed the treaty and have promised to adhere to a testing moratorium.

The evidence, including experience from U.S. tests in 1966 and from recent Russian and Chinese tests, show that we are very unlikely to ever have enough technical evidence gathered about a foreign test to persuade ourselves of its true nature. This means a foreign country can design and test whole classes of new nuclear weapons without fear the U.S. will ever agree that the Treaty was violated and that a response was required. To disprove this point, let the Senate debate and decide the nature of the recent Russian nuclear tests.

## The On-Site Inspection Regime: A Pig in a Poke

While the United States has the right under the CTBT to request an on-site inspection if it suspects cheating, no inspection can take place without the affirmative vote of 30 of the 51 members of the Executive Council (charged with verification and compliance functions), on which the United States is not guaranteed a seat. No inspection can take place prior to achieving an agreed Inspection Manual and an agreed Lists of Equipment. No agreed manual or list exists and the Parties are years from having an inspection regime in place. Moreover, given the rights of the "inspected party" as established under the Treaty, it is extremely unlikely that an inspection could obtain evidence of a violation.

A comparison between the verification regime established under CTBT and that established in Iraq following the Gulf War is instructive. Intrusive on-site inspections were expected to ensure Iraq was destroying existing weapons of mass destruction and no longer building new ones. The regime allowed for inspections "anytime, anyplace." Yet, this did not stop the Iraqi Government from stonewalling and constantly creating obstacles against those trying to verify Iraq's compliance. Evidence abounds that such intrusive measures did not stop Iraq from continuing its weapons production, proving that a country intent upon building (or testing) its weapons will find ways around even an intrusive verification regime.

## Implications for U.S. National Security

Many countries may decide to develop and deploy nuclear weapons without testing. Others may choose to test clandestinely. A determined country has several methods to conceal nuclear tests. It can test with minimal risk of detection and even less risk of effective sanctions at fairly high yields using well-established techniques and can gain a wealth of useful information for various weapons design purposes.

If the CTBT were not going to affect U.S. capabilities, it would be less critical whether the Treaty were verifiable or not. The fact is, however, the CTBT will freeze the U.S. nuclear weapons program and will make it impossible to assess with a high degree of confidence whether the current stockpile is reliable. And, because the Treaty is not verifiable, it will not effectively constrain other nations in the same way. Ultimately, these countries would likely be in a position to gain a military advantage over the United States.

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